NMD Test, Training, and Exercise Capability (TTEC):

An Early Look at Product Development utilizing SBA

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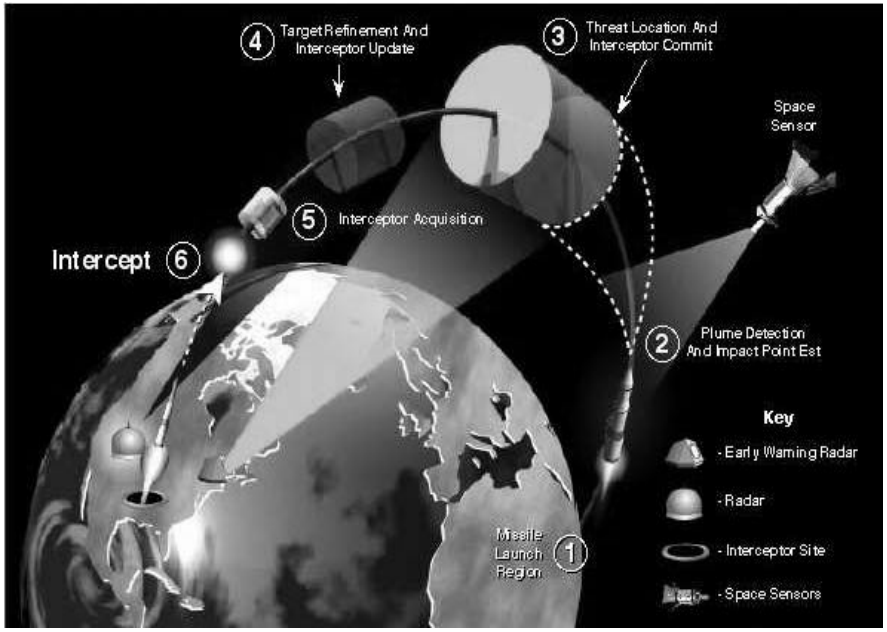
Agenda

- Introduction to NMD
- SBA at a glance
- The Product - TTEC
- Supporting the NMD Life cycle
- Challenges
- Summary

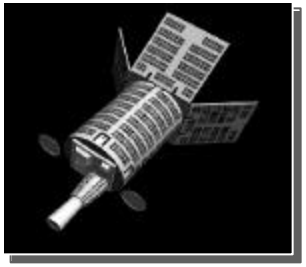
National Missile Defense (NMD) Program

Battle management Command, Control



Upgraded Early Warning Radar

In-flight Interceptor Communication



Space Based IR System

X-Band Radar

Ground Based Interceptor

Test, Training, and Exercise for NMD

Maintain operational readiness of the NMD system

- Via standalone and embedded means
- Test the health and maintenance of system
- Support operator training
- Support system exercises
  - element level
  - system-wide
  - large scale war-games

Simulation Based Acquisition (SBA)

An acquisition reform initiative that proposes an iterative process approach ***using modeling and simulation*** to integrate across phases within a program and between programs.

Simulation Based Acquisition (SBA)

Goals of SBA

- Reduce time, resources, and risk associated with the acquisition process
- **Increase military worth, quality, and supportability, while reducing costs**
- Enable integrated product and process development

SBA and Test, Training, and Exercise for NMD

- The Test, Training, and Exercise Capability for NMD will be accomplished through the use (reuse) of models and simulations, developed in an integrated product team environment

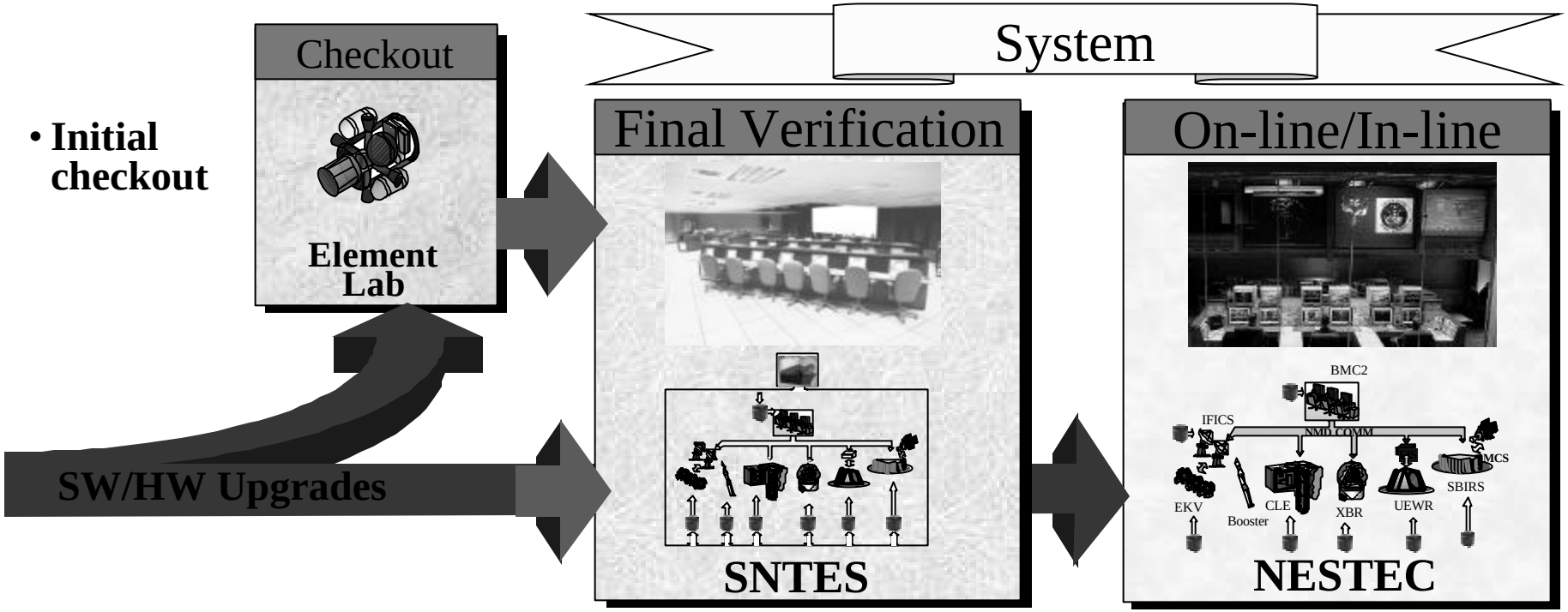
Test, Training, and Exercise Capability (TTEC)

- NST — NMD Standalone Trainer
- SNTES — Standalone NMD Test and Exercise System
- NESTEC — NMD Embedded System Test and Exercise Capability

TTEC is a functional part of the deployed system

For Test ...

- **Equipment Testing**



- **Initial checkout**

- **Integration and system test**
- **Results in system acceptance**

- **Final operational test**

For Training ...

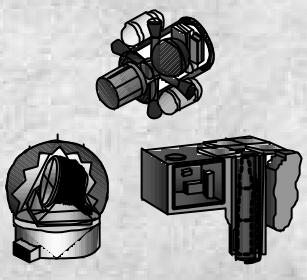
- **Personnel Training**

System

- **Operation & Maintenance**
- **Initial Qualification**

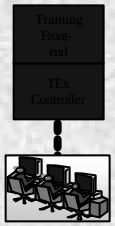
Crew

O/M, Initial



Element Trainer

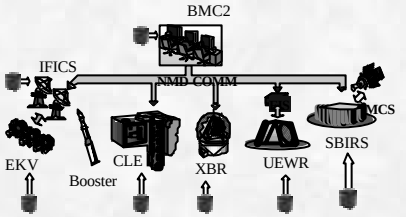
Qualification



NST

- **Individual Qualification (IQ)**
- **Unit Qualification (UQ)**
- **Off-line proficiency training**

Proficiency



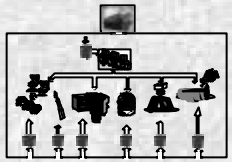
NESTEC

- **On-line proficiency training**

Staff

- **Trainers**
- **Commanders**
- **Staff**

Staff Training



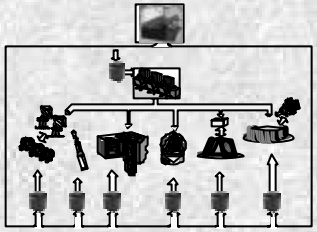
SNTES

For Exercise...

Exercise, War Games

- **People**
- **Equipment**

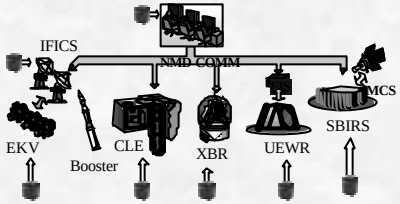
Standalone



SNTES

- **Laboratory environment**

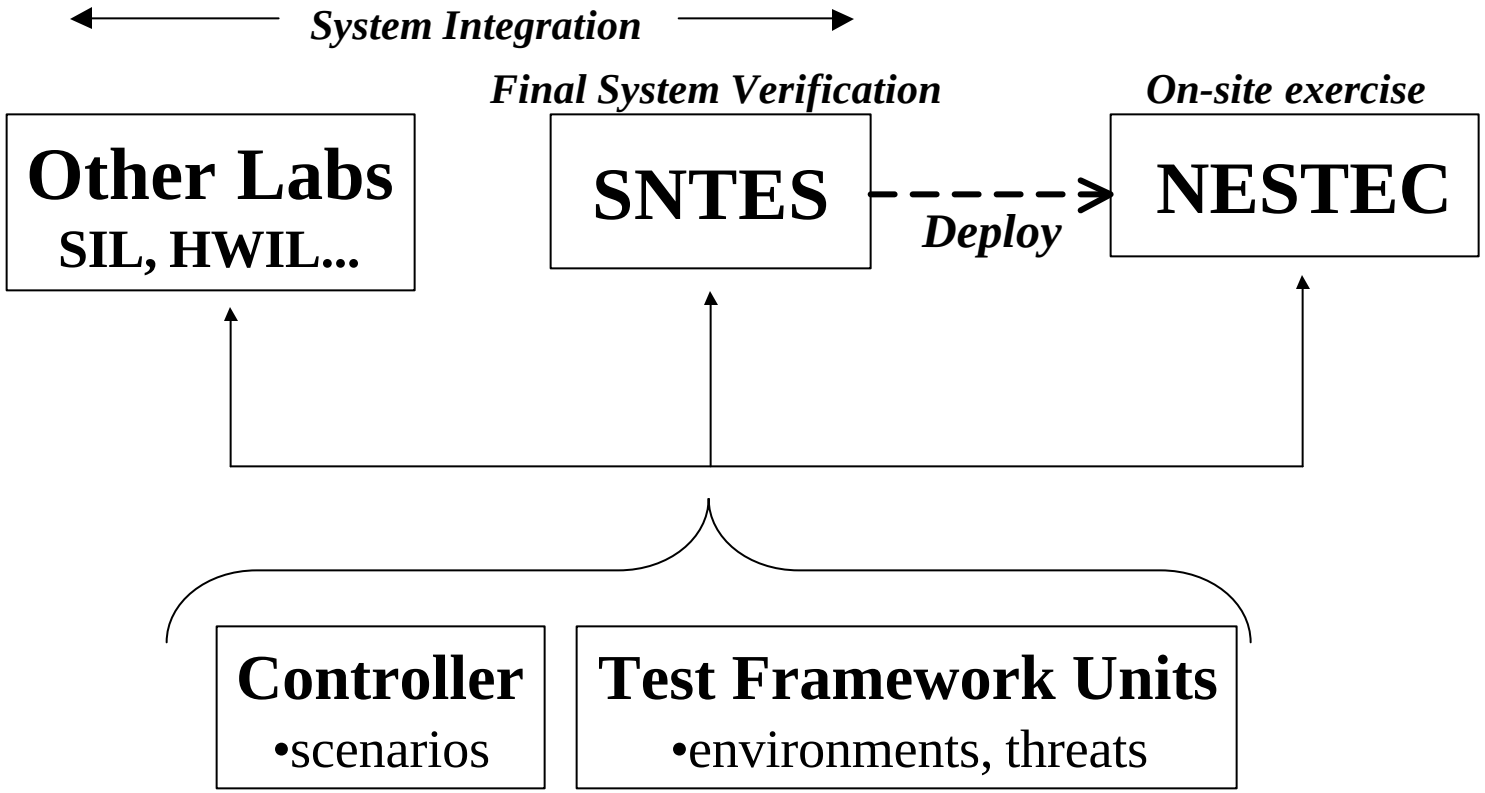
Operational



NESTEC

- **Hands-on with operational equipment**
- **No mission interference**
- **Can exercise/simulate unrecoverable functions**
- **Operational or war game exercises**

Common Architecture Approach



Reuse M&S to develop common test framework

Benefits of TTEC

- **Enable system verification**
- **Increase military worth (quality)**
- **Reduce life cycle costs**

Progressive integration

Virtual simulations vs. Live Tests

On-site upgrades and modifications

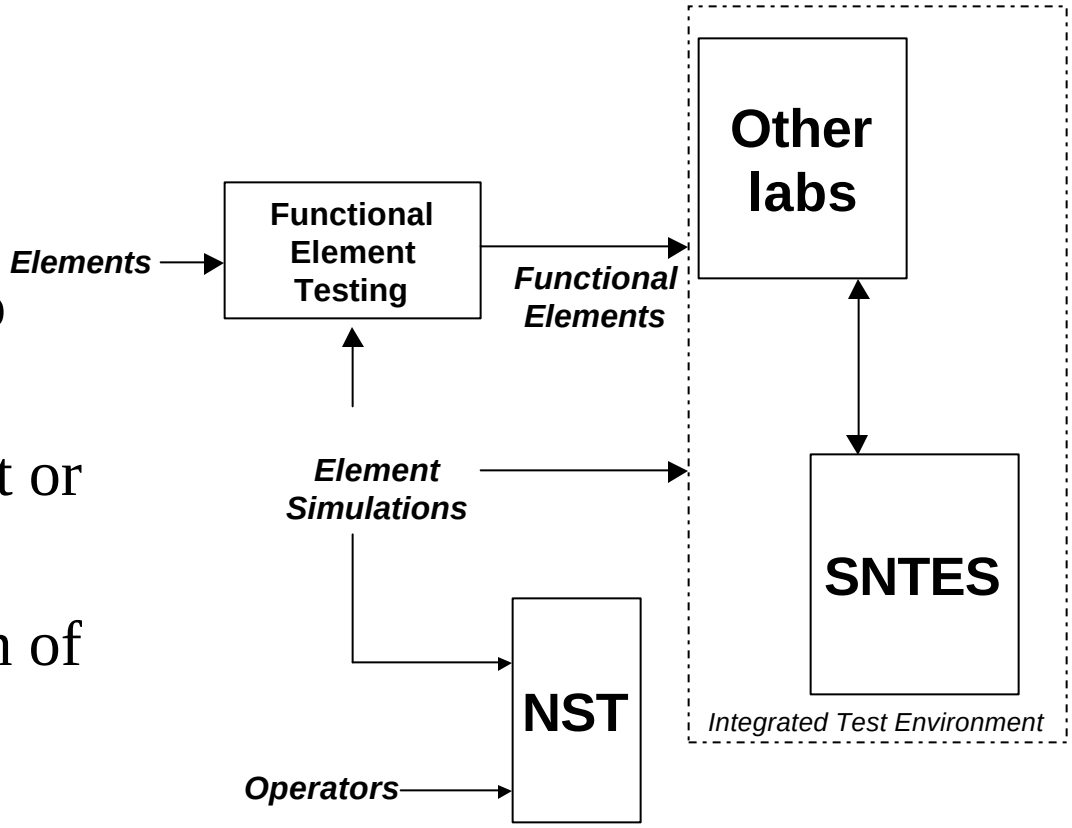
On-site training and exercise

Integrated tactics and doctrine

Use M&S across the program lifecycle phases

Qualification & System Integration Phase...

- BMC^2 Element level Training
- Integrate elements into full system
- Use functional element or surrogate simulation
- Progressive integration of element simulations



Progressive integration enables system verification and helps reduce lifecycle costs

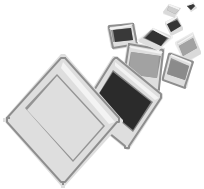
NST

Government Personnel

Government Schoolhouse

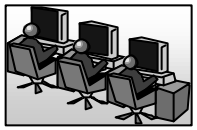
Government
Trained Operators

TTEC

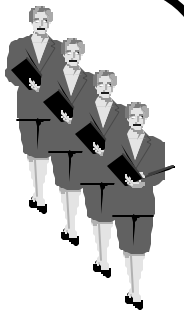


Courseware

NST



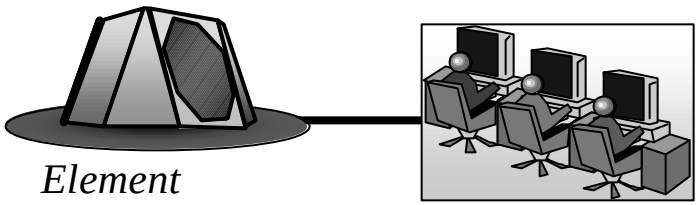
- Real BMC3
- Instructor Station



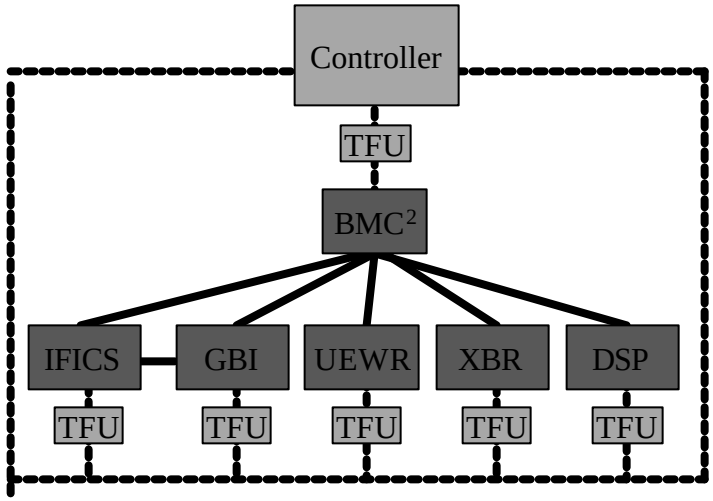
Trained
Government
Instructors

SNTES

- Integration & System Test
- Element and System Verification
- Virtual simulations vs live fire
- Uses functional elements with scenario simulations



Integration

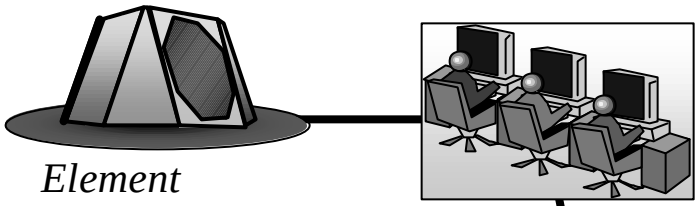


System Acceptance Phase...

- Verify system performance
- System acceptance
- Verify modifications and upgrades

Enables system verification and reduces costs

SNTES

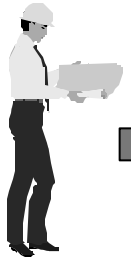


Element

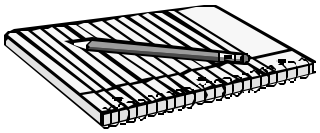
Integration

Witness

Acceptance

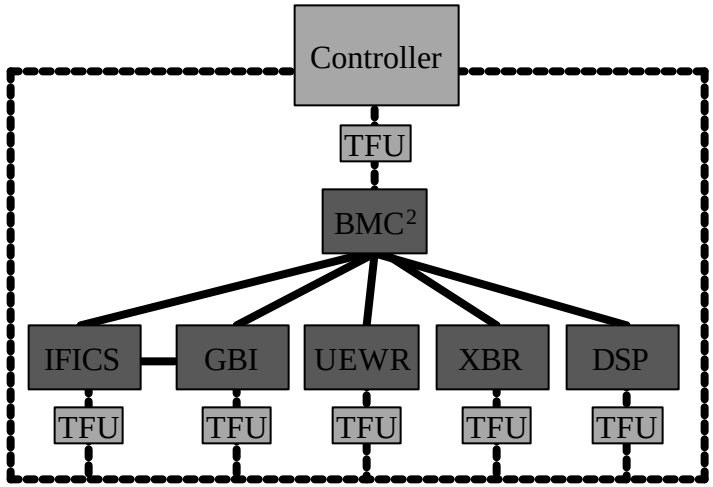


D&S



Procedure Checkout

- Verifies system performance
- System acceptance
- IOT&E
- Checkout procedures



Deployment and Sustainment Phase...

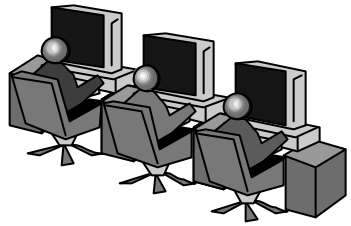
- On-site installation and checkout
- System test and exercise
- On-site system verification
- On-site training
- On-site modifications and upgrades
- Develop and rehearse tactics

Increases military worth and reduces costs

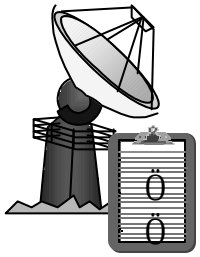
NESTEC

Deployment

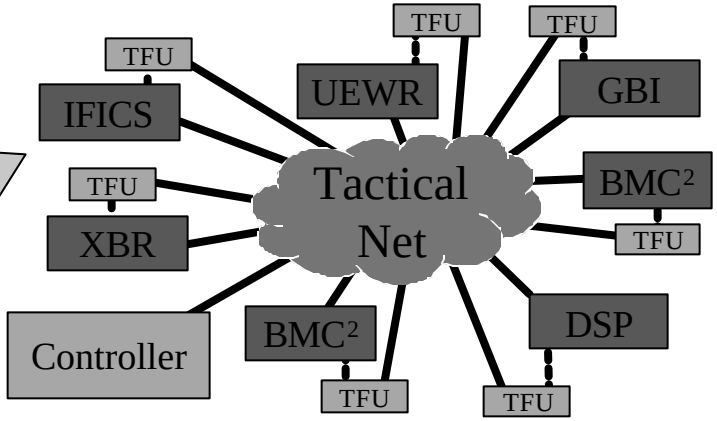
- On-site installation and checkout
- System test and Exercise
  - Element Level
  - System-Wide
  - Large Scale war-games



D&S

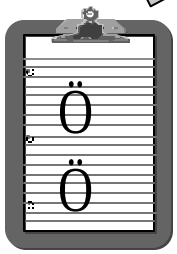


Installation & Checkout



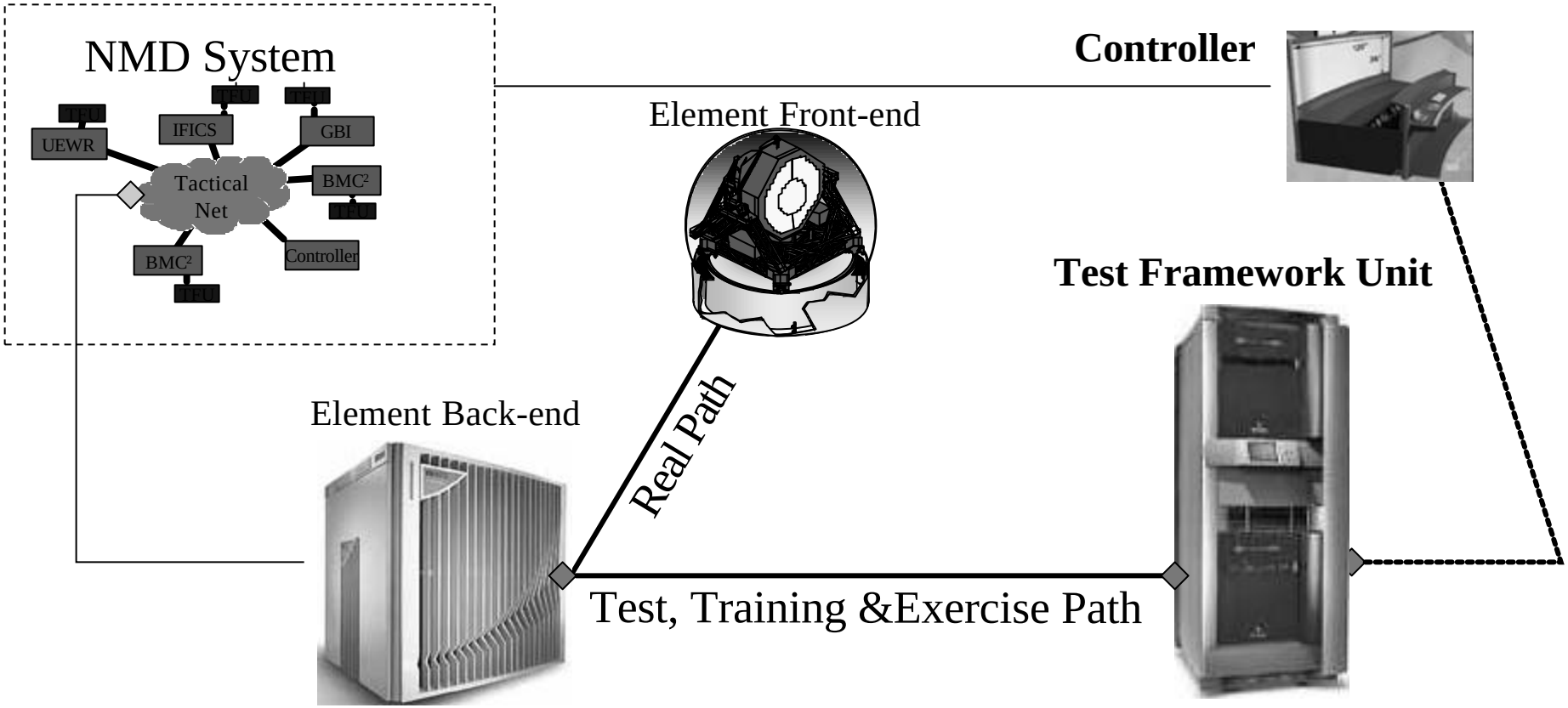
Sustainment

Upgrades, & Modifications



Government Checkout

On-site Exercise



- Full processor-in-the-loop
- Exercise all recoverable functions

- Real-time scenarios and environments:
- Conforms to TTEC Interface Specs

Challenges

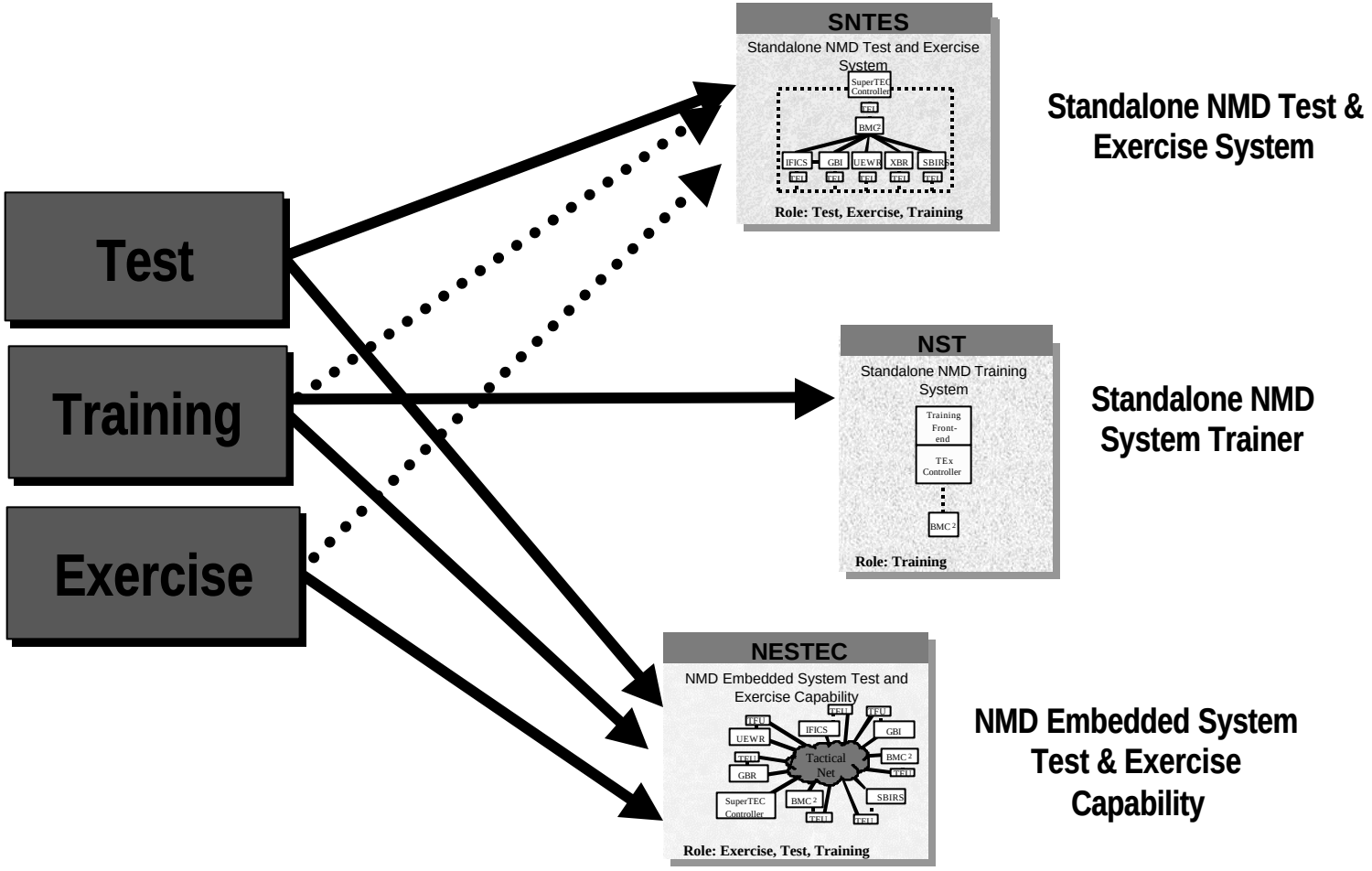
Problems

- Cultural
- Reuse
- M&S Interoperability
- Fidelity

Solutions

- Consolidation of laboratory resources, IPT
- HLA

Summary


Test
Training
Exercise
SNTES
Standalone NMD Test and Exercise System
SuperTEC Controller
TEU
BMC2
IFICS
GBI
UEWR
XBR
SBIRS
Role: Test, Exercise, Training
Standalone NMD Test & Exercise System
NST
Standalone NMD Training System
Training Front-end
TEx Controller
BMC2
Role: Training
Standalone NMD System Trainer
NESTEC
NMD Embedded System Test and Exercise Capability
Tactical Net
Role: Exercise, Test, Training
NMD Embedded System Test & Exercise Capability

Summary

Uses modeling and simulation across lifecycle phases

Enable system verification

Increase military worth

Reduce lifecycle costs

TTEC will help ”push” NMD towards SBA